Reprint of: J.K. Vanclay, 1988. Data requirements for modelling native forests. *In*: J.W. Leech, R.E. McMurtrie, P.W. West, R.D. Spencer and B.M. Spencer (eds) *Modelling Trees, Stands and Forests*. School of Forestry, Univ. Melbourne, Bulletin No. 5, p. 121-124.

Data Requirements for Modelling Native Forests

J.K. Vanclay

Department of Forestry,

G.P.O. Box 944, Brisbane, Qld. 4001

Summary

In many native forest types, permanent plots and long periods of measurement are necessary to distinguish diameter increments from natural fluctuations in stem size. Thus specifications at plot establishment must anticipate requirements ten or more years hence. A check list may assist more detailed examination of requirements.

Introduction

Native forests are characterized by some or all of the following characteristics:

- Not amenable to stem analysis (no annual rings)
- Slow growth rates
- Buttressing and/or other irregularities in stem at breast height
- Considerable variation in annual rainfall over time.

These factors dictate that permanent plots and long periods of time are required in order to distinguish diameter increments from natural fluctuations in stem size, and to distinguish competition induced mortality from drought induced mortality.

Where permanent plots already exist and provide satisfactory information, policy should ensure

- consistent standards of measurement and recording data, and that
- bias is avoided through discrete demarcation and partial replacement of plots.

Check List

When a new series of permanent plots is proposed, careful consideration must be given to ensure that the data collection initiated now will satisfy requirements ten or more years hence. Aspects to consider include

- Plot size, shape, orientation and isolation (if treated);
- Location (stratified random, etc) and demarcation of plots;
- Range of sites and treatments sampled (especially extremes);
- Site variables to be recorded (topography, geology, aspect, slope, soil, floristics, etc);
- Stand management details to be recorded (logging, silvicultural treatment, prescribed burning, etc);
- Stand variables recorded (predominant height, etc);
- Tree variables recorded (species, dbh, height, dominance, defect, spatial co-ordinates, etc);
- Identity of trees (painted numbers, plastic or metal tags nailed or wired to stem, etc);
- Minimum size and species of stems to be measured and recorded;
- Frequency and timing (during dormancy?) of remeasurement;
- Weather records (annual rainfall, etc);
- Other temporal variables (occurrence seed crops, pests, diseases, fires).

Remember that the quality of the data is more important than the quantity of data.

Some applications have special data collection requirements. If it is proposed to develop a vegetation-based site productivity assessment (e.g. ordination or classification), very detailed floristic information must be collected until the indicator species have been reliably identified. If a growth model is to be developed and used for developing and evaluating silvicultural prescriptions (such as "retain stems to achieve an average spacing of 7.5 metres with a minimum of 3 metres"), it may be necessary to record spatial information.

Bibliography of Selected Relevant References

ALDER, D. (1980) - Forest Volume Estimation and Yield Prediction. Vol. 2 - Yield Prediction.. F.A.O. Forestry Paper 22/2. F.A.O., Rome.

AVERY, T.E. & BURKHART, H.E. (1983) - Forest Measurements. McGraw Hill, New York.

BRUCE, D. (1977) - Yield differences between research plots and managed forests. J.For. 75, 14-17.

CUNIA, T. (1978) - On the objectives and methodology of national forest inventories. In National Forest Inventory. Papers presented at a joint meeting of IUFRO Groups S4.02 Forest Resource Inventory and S4.04 Forest Management Planning and Managerial Economics, 18-24 June 1978, Bucharest, Romania.

DEADMAN, M.W. (1979) - Session 2 on Growth and Yield Prediction. In Elliott, D.A. (Ed.) Mensuration for Management Planning of Exotic Forest Plantations, pp. 8-9. N.Z. For. Serv. For. Res. Instit., Symp. No. 20.

FERGUSON, I.S. (1983) - Collecting growth data. In Wright, H.L. (Ed.) Planning, Performance and Evaluation of Growth and Yield Studies, pp. 15-24. Proc. IUFRO Subject Group S4.01 Meeting, September 1979, Oxford. Commonw. For. Inst. Occas. Paper 20.

FOWLER, G.W. & ARVANTIS, L.G. (1979) - Aspects of statistical bias due to the forest edge: fixed area circular plots. Can. J. ,For. Res. 9, 383-389.

HANN, D.W. (1980) - Development and evaluation of an even- and uneven-aged ponderosa pine/Arizona fescue stand simulator. USDA For. Serv. Res. Pap. INT-267.

HUSCH, B. (1971) - Planning a Forest Inventory. F.A.O. Forestry and Forest Products Studies No. 17.

MEAD, D.A. (1982) - Evaluating the quality of data used for resource planning. In Cocoran, T. and Heij, W. (Eds.) Proc. of Working Party S3.04.01 Planning and Control of Forest Operations, XVII IUFRO World Congress 6-17 September 1981, Kyoto, Japan. Life Sc. and Ag. Exp. Sta., Univ. of Maine at Orono. Misc. Rep. 264.

RENNOLLS, K. (1978) - Top height: its definition and estimation. Commonw. For. Rev. 57, 215-219.

ROSE, D.W., GREGERSEN, H.M., EK, A.R. & HOGANSON, H. (1981) – Planning with minimum data and technology. In Vodak, M.C., Leuschner, W.A. and Navon, D.I. (Eds.) Proc. IUFRO Symp. on Forest Management Planning: Present Practice and Future Decisions. 18-20 August 1980. Virginia Polytech. Instit. and State Univ., Blacksburg, Va. Sch. of For. and Wildlife Resources Publ. FWS-1-81.

SCHMIDT-HAAS, P. (1981) – Swiss continuous forest inventory twenty years experience In Proceedings of Renewable Resource Inventories for Monitoring Changes and Trends, Conference, pp 133-140. 15-19 August 1983, Corvallis,Oregon.

STRAND, L. (1970) – Regression problems in yield table construction. Madd. Norske Skogforsoksv. 27, 495-505.

WENSEL, L.C. (1983) – Predicting change and trend in forest stand. In Proceedings of Renewable Resource Inventories for Monitoring Changes and Trends Conference, pp 149-152, 15-19 August 1983, Corvallis, Oregon.

ZEIDE, B. (1980) – Plot size optimization. For. Sci. 26, 251-257.